ATLAS PORTLAND CEMENT

HANDY REFERENCE TABLES

The Atlas Portland Cement Company
25 Broadway, New York, N. Y.

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FOREWORD

The tables in this booklet originally appeared in "Contractor's Atlas", a monthly magazine published by The Atlas Portland Cement Company, and the great demand for them convinced us that a reprint in handy form would be found very useful.

Suggestions for additional tables and for the revision of present tables to be included in future reprints, will be welcome.

Enlarged and Revised 1926

TABLE No. 1

Weights and Areas of Reinforcing Steel

Sizes in heavy type are standard sizes stocked by dealers

SIZE	Area (sq. in.)	Lbs. per Foot	Ft. per Ton. of 2,000 lbs.*
	Sq. in.	Lbs.	Feet
¼ inch round bars	**.0491**	**.167**	**12,000**
¼ inch square bars	.0625	.213	9,390
⅜ inch round bars	**.1105**	**.376**	**5,320**
⅜ inch square bars	.1406	.478	4,180
½ inch round bars	**.1963**	**.668**	**3,000**
½ inch square bars	**.2500**	**.850**	**2,365**
⅝ inch round bars	**.3068**	**1.043**	**1,912**
⅝ inch square bars	.3906	1.328	1,508
¾ inch round bars	**.4418**	**1.502**	**1,331**
¾ inch square bars	.5625	1.913	1,046
⅞ inch round bars	**.6013**	**2.044**	**978**
⅞ inch square bars	.7656	2.603	768
1 inch round bars	**.7854**	**2.670**	**749**
1 inch square bars	**1.0000**	**3.400**	**588**
1⅛ inch round bars	.9940	3.380	592
1⅛ inch square bars	**1.2656**	**4.303**	**465**
1¼ inch round bars	1.2272	4.172	479
1¼ inch square bars	**1.5625**	**5.313**	**376**

*Reinforcing is generally sold by the ton. This column gives the number of feet of each size bar in one ton.

TABLE No. 2

Weights and Volumes of Materials for Concrete

CEMENT

Bag (net) equals 1 cu. ft	94 lbs.
Barrel—4 bags (net)	376 lbs.
Standard car loadings (equivalent to capacity plus 10%)	
Small car (in bags)	173 bbls.
Medium car (in bags)	231 bbls.
Large car (in bags)	289 bbls.

SAND

Cubic foot	90–95 lbs.
Cubic yard	2400–2600 lbs.

CRUSHED STONE 1½ in. to ¼ in. in Size

(Average from a number of quarries)

Limestone per cu. yd	2,420 lbs.
Granite per cu. yd	2,485 lbs.
Trap per cu. yd	2,700 lbs.

Crushed stone is often sold by the ton, while tables for figuring amounts of materials give result in cubic yards. To find number of tons required, multiply the number of cubic yards by 1 1-5 for limestone and granite; and by 1⅓ for trap rock.

SLAG

Cubic foot	65–70 lbs. per cu. ft. 1755–1890 lbs. per cu. yd.

HYDRATED LIME

Cubic foot	About 40 lbs.

CONCRETE

Cinder concrete per cu. ft	112 lbs.
Gravel and Limestone concrete per cu. ft	150 lbs.
Trap-rock concrete per cu. ft	155 lbs.

TABLE No. 3

Quantities for Mortar and Concrete

(From "Concrete Plain and Reinforced," by Taylor & Thompson)

MORTAR

Amounts needed for One Cubic Yard

PROPORTIONS BY PARTS		Barrels of Cement	Cubic Yards of Sand
Cement	Sand		
1	0	8.31	
1	1	4.88	0.72
1	1½	3.87	0.86
1	2	3.21	0.95
1	2½	2.74	1.01
1	3	2.39	1.06
1	4	1.90	1.13

CONCRETE

Amounts needed for One Cubic Yard

PROPORTIONS BY PARTS			Barrels of Cement	Cu. Yds. of Sand	Cu. Yds. Stone or Pebbles
Cement	Sand	Stone			
1	1½	3	1.91	0.42	0.85
1	2	3	1.74	0.52	0.77
1	2	4	1.51	0.45	0.89
1	2½	4	1.39	0.51	0.82
1	2½	5	1.24	0.46	0.92
1	3	6	1.06	0.47	0.94

TO USE TABLE: Figure the number of cubic yards of mortar or concrete needed. Multiply this quantity by the figures given for the proper mix and the result will be the amount of material needed. In proportioning, one bag of cement equals one cubic foot.

TABLE No. 4

Covering Capacity of Mortar and Stucco

Area covered by one barrel (4 bags) of cement in various mixes

MIX Parts by Volume		THICKNESS OF COAT				
		¼ Inch	⅜ Inch	½ Inch	¾ Inch	1 Inch
Cement	Sand	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
1	1	266	177	133	89	66
1	1½	336	226	168	112	84
1	2	404	270	202	135	101
1	2½	472	314	236	157	118
*1	3	542	362	271	181	136
1	3½	612	408	306	204	153
1	4	682	455	341	227	171

Area covered by one Cubic Yard of Sand in Various Mixes

MIX Parts by Volume		THICKNESS OF COAT				
		¼ Inch	⅜ Inch	½ Inch	¾ Inch	1 Inch
Cement	Sand	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
1	1	1800	1200	900	600	450
1	1½	1508	1006	754	503	377
1	2	1364	910	682	455	341
1	2½	1282	855	641	427	321
*1	3	1222	815	611	407	306
1	3½	1178	785	589	393	294
1	4	1148	765	574	383	287

*1 : 3 is the mix most used for stucco work.

HOW TO USE THE TABLE: Figure the wall area in square feet. Divide this area by the proper number in the tables above and the result will be the number of barrels of cement required or the number of cubic yards of sand.

NOTE: The above areas are calculated for average sand and with no allowance for waste. In estimating, allowance should be made for waste. When figured for stucco, the loss of mortar in forming the keys behind the lath for the first coat should be taken into account.

TABLE No. 5

*Quantities of Mortar, Cement and Sand for laying 1000 Brick

Width of Joint	Cu. Ft. of Mortar	1:2 Mortar		1:2½ Mortar		1:3 Mortar		1:3½ Mortar	
		Cement Bbls.	Sand Cu. Yd.	Cement Bbls.	Sand Cu. Yd.	Cement Bbls.	Sand Cu. Yd.	Cement Bbls.	Sand Cu. Yd.
¼ in.	10	1.2	0.35	1.0	0.37	0.9	0.39	0.8	0.41
⅜ "	15	1.8	0.53	1.5	0.56	1.3	0.59	1.2	0.61
½ "	18	2.1	0.63	1.8	0.67	1.6	0.71	1.4	0.73
⅝ "	22	2.6	0.77	2.2	0.82	1.9	0.86	1.7	0.90

*Note:—In using this table, bear in mind that quantities for brick work are only approximate, because there is sure to be considerable variation in thickness of joints and in the size of brick.

Concrete Building Block and Clay Tile

	Cement for Laying 1000 1:3 Mortar	Sand for Laying 1000 1:3 Mortar	Number of Block to 100 Sq. Ft. of Wall Surface
Concrete Block 8 x 8 x 16.....	4.1 bbls.	1.75 cu. yds.	112
Clay Tile† 3, 4, or 6 in. Partition	2.3 bbls.	1.03 cu. yds.	
Clay Tile†—Load Bearing:			
6 x 12 x 12.....	2.9 bbls.	1.29 cu. yds.	100
8 x 12 x 12.....	3.5 bbls.	1.55 cu. yds.	100
12 x 12 x 12.....	4.6 bbls.	2.06 cu. yds.	100

†This information on Clay Tile was furnished by The Hollow Building Tile Association.

TABLE No. 6

Board Feet in Various Sizes and Lengths of Lumber

For Estimating Forms and Other Timber Work

Size of Timber in Inches	LENGTH OF PIECE IN FEET							
	10	12	14	16	18	20	22	24
1x 2	1⅔	2	2⅓	2⅔	3	3⅓	3⅔	4
1x 3	2½	3	3½	4	4½	5	5½	6
1x 4	3⅓	4	4⅔	5⅓	6	6⅔	7⅓	8
1x 5	4⅙	5	5⅚	6⅔	7½	8⅓	9⅙	10
1x 6	5	6	7	8	9	10	11	12
1x 8	6⅔	8	9⅓	10⅔	12	13⅓	14⅔	16
1x10	8⅓	10	11⅔	13⅓	15	16⅔	18⅓	20
1x12	10	12	14	16	18	20	22	24
2x 4	6⅔	8	9⅓	10⅔	12	13⅓	14⅔	16
2x 6	10	12	14	16	18	20	22	24
2x 8	13⅓	16	18⅔	21⅓	24	26⅔	29⅓	32
2x10	16⅔	20	23⅓	26⅔	30	33⅓	36⅔	40
2x12	20	24	28	32	36	40	44	48
2x14	23⅓	28	32⅔	37⅓	42	46⅔	51⅓	56
3x 4	10	12	14	16	18	20	22	24
3x 6	15	18	21	24	27	30	33	36
3x 8	20	24	28	32	36	40	44	48
3x10	25	30	35	40	45	50	55	60
3x12	30	36	42	48	54	60	66	72
3x14	35	42	49	56	63	70	77	84
4x 4	13⅓	16	18⅔	21⅓	24	26⅔	29⅓	32
4x 6	20	24	28	32	36	40	44	48
4x 8	26⅔	32	37⅓	42⅔	48	53⅓	58⅔	64
4x10	33⅓	40	46⅔	53⅓	60	66⅔	73⅓	80
4x12	40	48	56	64	72	80	88	96
4x14	46⅔	56	65⅓	74⅔	84	93⅓	102⅔	112
6x 6	30	36	42	48	54	60	66	72
6x 8	40	48	56	64	72	80	88	96
6x10	50	60	70	80	90	100	110	120
6x12	60	72	84	96	108	120	132	144
6x14	70	84	98	112	126	140	154	168
8x 8	53⅓	64	74⅔	85⅓	96	106⅔	117⅓	128
8x10	66⅔	80	93⅓	106⅔	120	133⅓	146⅔	160
8x12	80	96	112	128	144	160	176	192
8x14	93⅓	112	130⅔	149⅓	168	186⅔	205⅓	224
8x16	106½	128	149	170	192	213	234	256
10x10	83⅓	100	116⅔	133⅓	150	166⅔	183⅓	200
10x12	100	120	140	160	180	200	220	240
10x14	116⅔	140	163⅓	186⅔	210	233⅓	256⅔	280
10x16	133⅓	160	186⅔	213⅓	240	266⅔	293⅓	320
12x12	120	144	168	192	216	240	264	288
12x14	140	168	196	224	252	280	308	336
12x16	160	192	224	256	288	320	352	384
14x14	163⅓	196	228⅔	261⅓	294	326⅔	359⅓	392
14x16	186⅔	224	261⅓	298⅔	336	373⅓	410⅔	448

NOTE: Figures given are Board Feet. Lumber is usually priced by the Thousand Board Feet. A piece 1 inch thick, 12 inches wide and 1 foot long constitutes 1 foot Board Measure. Dressed lumber is usually ⅛ to ¼ in. smaller than the size specified due to material being removed in dressing.

TABLE No. 7

Weights of Materials*

METALS

	Wt. per Cu. Ft.
Aluminum	165 lbs.
Babbitt Metal	443
Brass	534
Copper	556
Iron—cast	450
Iron—wrought	485
Lead	706
Steel	490
Zinc	440

TIMBER—Seasoned

Cedar	22
Chestnut	41
Cypress	30
Hemlock	29
Locust	46
Maple	43
Oaks	41–46
Pine, Long-leaf yellow	44
Pine, Short-leaf yellow	38
Pine, White	26
Spruce	27

LIQUIDS

	Wt. per Cu. Ft.
Alcohol, 100%	49 lbs.
Oils, mineral, vegetable and lubricating	57
Petroleum	55
Gasolene	42
Water—fresh	62½
Water—sea	64

COAL AND COKE—Piled

Anthracite	47– 58
Bituminous	40– 54
Charcoal	10– 14
Coke	23– 32

EARTHS—Excavated

Clay-damp, plastic	110
Earth-moist, loose	76
Earth-moist, packed	96
Sand-dry, loose	90–105
Sand-dry, packed	100–120

MISCELLANEOUS

Cork	15
Glass	160
Rubber	58
Wax	60

*Weights of concrete materials (cement, sand, stone, etc.) are given in Table No. 2.—Weights in table above are from "Pocket Companion" of the Carnegie Steel Company.

TABLE No. 8

Quantities for Concrete Roads and Pavements

Width in Feet	Square Yards per Mile	Thickness		Cubic Yards Concrete per Linear Foot of Pavement	Material Required per Linear Foot of Pavement—1:2:3 Mix*		
		Sides, Inches	Center, Inches		Cement Barrels	Sand Cubic Yards	Stone or Pebbles Cubic Yards
9	5,280	6	8	.204	.355	.106	.157
10	5,867	6	8	.227	.394	.118	.175
16	9,387	6	8	.362	.630	.188	.279
16	"	7	9	.411	.715	.214	.316
16	"	8	10	.461	.802	.240	.355
18	10,560	6	8	.407	.708	.212	.313
18	"	7	9	.463	.806	.241	.357
18	"	8	10	.519	.903	.270	.400
20	11,733	6	8	.453	.788	.235	.349
20	"	7	9	.514	.887	.265	.393
20	"	8	10	.576	1.002	.300	.444
24	14,080	6	8	.543	.945	.282	.418
24	"	7	9	.617	1.074	.321	.475
24	"	8	10	.691	1.202	.359	.532

Quantities for 1000 Square Yards Concrete Base for Pavements

UNIFORM THICKNESS THROUGHOUT

Thickness of Base	Cubic Yards of Concrete per 1,000 Sq. Yds. of Pavement	MIX*								
		1:2:4			1:2½:5			1:3:6		
		Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.
5 in.	139	210	62	124	172	64	128	147	65	135
6 "	167	252	75	149	206	77	153	177	78	157
7 "	194	294	87	173	241	89	179	206	91	183
8 "	222	335	100	198	275	104	204	235	104	209

Quantities for 1000 Square Yards Concrete Roads and Pavements

CROWNED SURFACE

Thickness		Average Thickness	Cu. Yds. of Concrete per 1,000 Sq. Yds. of Pavem't	MIX*								
				1:1½:3			1:2:3			1:2:4		
Sides	Center			Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.
5 in.	7 in.	6.33 in.	176	336	74	150	306	91	136	266	79	157
5 "	7½ "	6.67 "	185	353	78	157	322	96	143	279	83	165
6 "	8 "	7.33 "	204	389	86	174	355	106	157	308	91	182
6 "	8½ "	7.67 "	213	406	89	181	370	111	164	321	95	190
7 "	9 "	8.33 "	231	441	97	196	402	120	178	348	103	206
7 "	9½ "	8.67 "	241	460	101	205	420	125	186	364	109	215
8 "	10 "	9.33 "	259	495	109	220	450	135	200	391	116	231
8 "	10½ "	9.67 "	269	514	113	229	468	140	207	406	120	240

*For mixtures other than those given, multiply the number of cubic yards of concrete by the factors given in Handy Reference Table No. 3.

TABLE No. 9

*Quantities for One-Course Sidewalks and Floors

100 Square Feet of Surface

Thickness	Cubic Yards of Concrete per 100 Sq. Ft.	1:2:3 Mix			1:2:4 Mix		
		Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.
3 in.	0.93	1.62	0.48	0.72	1.41	0.42	0.83
3½ "	1.08	1.88	0.56	0.83	1.63	0.49	0.96
4 "	1.22	2.14	0.63	0.94	1.84	0.55	1.09
4½ "	1.39	2.42	0.72	1.07	2.10	0.62	1.23
5 "	1.54	2.68	0.80	1.18	2.33	0.69	1.37
5½ "	1.70	2.96	0.88	1.31	2.56	0.76	1.51
6 "	1.85	3.22	0.96	1.42	2.79	0.83	1.64

*Quantities for Two-Course Sidewalks and Floors

100 Square Feet of Surface

Thickness	Base Course					
	1:2½:5 Mix			1:3:6 Mix		
	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.
3 in.	1.15	0.43	0.85	0.98	0.43	0.87
3½ "	1.34	0.50	0.99	1.15	0.51	1.02
4 "	1.51	0.56	1.12	1.29	0.56	1.12
4½ "	1.72	0.64	1.28	1.47	0.65	1.31
5 "	1.91	0.71	1.42	1.63	0.72	1.44

Thickness	Top Course					
	1:1 Mix		1:1½ Mix		1:2 Mix	
	Cement Bbls.	Sand Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Cement Bbls.	Sand Cu. Yds.
½ in.	0.75	0.11	0.60	0.13	0.50	0.15
¾ "	1.13	0.17	0.90	0.20	0.75	0.22
1 "	1.50	0.22	1.20	0.27	1.00	0.29

*The quantities given in this table are based on exact thicknesses and with no allowance for waste. Variations and inaccuracies in the sub-grade may cause quantities to differ from the figures given in the table.

TABLE No. 10

*Quantities for Concrete Silos—6-in. Walls

1:2:4 Walls and 1:2½:5 Floor and Footings; without Roof

Size Diameter x Height	Cement Bbls.	Sand Cu.Yds.	Stone or Pebbles Cu. Yds.
10 x 25 ft.	25.0	7.5	15.0
12 x 30 ft.	36.0	11.0	22.0
12 x 35 ft.	41.0	12.5	25.0
14 x 30 ft.	42.5	13.0	26.0
14 x 35 ft.	48.0	14.7	29.4
14 x 40 ft.	54.5	16.5	33.0
16 x 40 ft.	62.5	19.0	38.0
16 x 45 ft.	69.0	21.0	42.0
18 x 45 ft.	80.0	24.5	49.0
18 x 50 ft.	86.5	26.5	53.0

*These quantities are approximate and intended for rough preliminary estimates.

Quantities for 100 Concrete Fence Posts

Square Section—1:2:3 Mix

Size			Cement	Sand	Stone or Pebbles	Reinforcement
Top	Bottom	Length	Bbls.	Cu. Yds.	Cu. Yds.	4 round bars
						Size & total weight
3 in. sq.	5 in. sq.	6 ft. 6 in.	4.9	1.5	2.2	¼ in.— 433 lbs.
4 in. sq.	5 in. sq.	7 ft. 6 in.	6.9	2.1	3.0	¼ in.— 500 lbs.
4 in. sq.	6 in. sq.	8 ft. 0 in.	9.3	2.8	4.1	⅜ in.—1200 lbs.

TABLE No. 11

Capacity of Round Tanks

Per Foot of Height

Diameter Inside Feet	Cross-sectional Area, Square Feet	Capacity per Foot of Height Gallons	Diameter Inside Feet	Cross-sectional Area, Square Feet	Capacity per Foot of Height Gallons
4	12.6	94	12	113.1	846
5	19.6	147	14	153.9	1151
6	28.3	211	16	201.1	1503
7	38.5	288	18	254.5	1905
8	50.3	377	20	314.2	2352
9	63.6	476	25	490.9	3671
10	78.5	587	30	706.9	5290

Capacity of Rectangular and Square Tanks

Per Foot of Height

Size Inside Feet	Area of Bottom, Square Feet	Capacity per Foot of Height, Gallons	Size Inside, Feet	Area of Bottom, Square Feet	Capacity per Foot of Height, Gallons
4x 4	16	120	9x14	126	943
4x 6	24	180	9x16	144	1078
4x 8	32	240	9x18	162	1212
5x 5	25	187	10x10	100	748
5x 6	30	224	10x12	120	898
5x 8	40	300	10x14	140	1049
5x10	50	374	10x16	160	1199
6x 6	36	270	10x18	180	1349
6x 8	48	359	10x20	200	1496
6x10	60	450	12x12	144	1078
6x12	72	539	12x14	168	1259
7x 7	49	367	12x16	192	1438
7x 8	56	419	12x18	216	1618
7x10	70	524	12x20	240	1798
7x12	84	629	14x14	196	1468
7x14	98	734	14x18	252	1888
8x 8	64	479	14x22	308	2305
8x10	80	599	16x16	256	1916
8x12	96	719	16x20	320	2395
8x14	112	838	16x24	384	2875
8x16	128	958	18x18	324	2425
9x 9	81	606	18x24	432	3231
9x10	90	674	18x28	504	3770
9x12	108	808			

Explanation of Table: To find the capacity of any tank, take the figure given in the column of capacities and multiply by the height of tank in feet; the result will be the capacity in gallons.

For sizes of tanks not given, find the area of tank cross-section, and use capacity of the tank having the nearest cross-sectional area.

TABLE No. 12*

Weights of Floors, Roofs and Walls

KIND	Weight in Lbs. per Sq. Ft.
FLOORS	
⅞ in. Maple finish floor and ⅞ in. spruce under floor on 2 in. x 4 in. sleepers, 16 in. centers, with 2 in. dry cinder concrete filling	18 lbs.
Cinder concrete filling per inch of thickness	7
Cement finish per inch of thickness	12
Asphalt mastic flooring 1½ in. thick	18
3 in. Creosoted wood blocks on ½ in. mortar base	21
Solid flat tile on 1 in. mortar bed	23
CEILINGS	
Plaster on tile or concrete	5
Suspended Metal Lath and plaster	10
ROOFS	
Five-ply felt and gravel	6
Four-ply felt and gravel	5½
Three-ply ready roofing	1
Cement tile	16
Slate, ¼ in. thick	9½
Sheathing, 1 in. thick, Yellow Pine	4
2 in. Book Tile	12
3 in. Book Tile	20
Skylight with galvanized iron frame. ⅜ in. glass	6

KIND	Weight in Lbs. per Sq. Ft.		
	Unplastered	One Side Plastered	Both Sides Plastered
WALLS			
9 in. Brick Wall	84	89	..
13 in. Brick Wall	121	126	..
18 in. Brick Wall	168	173	..
22 in. Brick Wall	205	210	..
26 in. Brick Wall	243	248	..
4 in. Brick, 4 in. Tile Backing	60	65	..
4 in. Brick, 8 in. Tile Backing	75	80	..
9 in. Brick, 4 in. Tile Backing	102	107	..
8 in. Tile	33	38	43
12 in. Tile	45	50	55
PARTITIONS			
3 in. Clay Tile	17	22	27
4 in. Clay Tile	18	23	28
6 in. Clay Tile	25	30	35
8 in. Clay Tile	31	36	41
10 in. Clay Tile	35	40	45
3 in. Gypsum Block	10	15	20
4 in. Gypsum Block	12	17	22
5 in. Gypsum Block	14	19	24
6 in. Gypsum Block	16	21	26
2 in. Solid Plaster	..	..	20
4 in. Solid Plaster	..	..	32
4 in. Hollow Plaster	..	..	22

* *From "Useful Data," a handbook published by the Corrugated Bar Company, Buffalo, N.Y.

TABLE No. 13

Data on Mixing Concrete

Dimensions for Bottomless Measuring Boxes of Various Capacities

Capacity in Cubic Feet	Inside Measure		
	Length Inches	Breadth Inches	Height Inches
1 cubic foot	12	12	12
1¼ cubic feet	15	15	9⅝
1½ cubic feet	15	15	11½
1¾ cubic feet	15	15	13½
2 cubic feet	18	18	10⅝
2¼ cubic feet	18	18	12
2½ cubic feet	18	18	13⅜
2¾ cubic feet	18	18	14⅝
3 cubic feet	18	18	16

*Hourly Output of Concrete for Various Proportions Based on Average Time Per Batch

Proportions, 1-Bag Batch	Aver. Time per Batch 2 Minutes	Aver. Time per Batch 3 Minutes	Aver. Time per Batch 4 Minutes
	Cubic Yds.	Cubic Yds.	Cubic Yds.
1:1½:3	4.0	2.6	2.0
1:2:3	4.3	2.9	2.2
1:2:4	5.0	3.3	2.5
1:2½:4	5.4	3.6	2.7
1:2½:4½	5.7	3.8	2.9
1:2½:5	6.0	4.0	3.0
1:3:6	7.1	4.7	3.5

*In presenting this table on mixing concrete, the Editors realize that no hard and fast figures can be given. Delays or slowings-down occasionally occur on every job. This table if employed with caution may be used to advantage for estimating a job. For example, taking an average time of 3 minutes per batch, the output on a 1 bag 1:2:4 mix would be 3.3 cubic yards of concrete per hour. In an 8-hour day this would total 26.4 cubic yards, from which should be deducted a liberal allowance for delays and stoppages.

Computing Daily Yardage of Concrete Mixed and Placed

Proportions	Amount of Concrete in a 1-Bag Batch	
	Cubic Feet	Cubic Yards
1:1½:3	3.53	.131
1:2:3	3.90	.145
1:2:3½	4.22	.156
1:2:4	4.50	.167
1:2½:4	4.88	.181
1:2½:4½	5.17	.192
1:2½:5	5.44	.202
1:3:5	5.81	.215
1:3:5½	6.11	.226
1:3:6	6.38	.236

Example:—Your mixer has turned out 164 two-bag batches of 1:2½:5 concrete and you want to know how much this amounts to in cubic yards. The table gives .202 cubic yards for a one-bag batch, so we multiply .202 by 2 to give us the quantity for a two-bag batch, and this by 164 batches to get the total yardage. Thus: .202 x 2 x 164 =66.2 cubic yards.

TABLE No. 14

Average Strength of Concrete

(When good quality of aggregates are used)

Mixture	7 Days	28 Days	6 Months
	lbs. per sq. in.	lbs. per sq. in.	lbs. per sq. in.
1:1½:3	1600	2700	3700
1:2:4	1100	2100	3000
1:2½:5	800	1600	2100
1:3:6	500	1300	1800

Bearing Power of Soils in Tons per Square Foot

	Minimum	Maximum
Rock, hardest	200	..
Rock equal to best ashlar masonry	25	30
Rock equal to best brick masonry	15	20
Rock equal to poor brick masonry	5	10
Clay, thick beds, always dry	6	8
Clay, thick beds, moderately dry	4	6
Clay, soft	1	2
Gravel and coarse sand, hard	8	10
Sand, dry, well packed	4	6
Sand, clean, dry	2	4

TABLE No. 15

Weights and Areas of Reinforcing Mesh suitable for Concrete Roads

TRIANGLE MESH FABRIC

(Manufactured by American Steel & Wire Co., New York)

STYLE	MAIN WIRES Area Per Ft. of Fabric	TRANSVERSE WIRES Area Per Ft. of Fabric	WEIGHT IN POUNDS Per 100 Sq. Ft.
072-P	.062 sq. in.	.009 sq. in.	31
084-P	.074 " "	.009 " "	35
097-P	.087 " "	.009 " "	40
107	.101 " "	.025 " "	50
126	.120 " "	.025 " "	57
146	.140 " "	.025 " "	65

This company also manufactures an electric welded fabric in various sizes.

"STEELCRETE" ROAD MESH

(Manufactured by Consolidated Expanded Metal Companies, Braddock, Pa.)

Designation	Standard Width of Sheet	Area in Square Inches Per Ft. of Width	Weight in Pounds Per 100 Square Feet
No. 20	5 ft. 0 in.	.053	20
No. 25	5 ft. 0 in.	.066	25
No. 28	6 ft. 0 in.	.074	28
No. 30	5 ft. 0 in.	.079	30
No. 40	6 ft. 3 in.	.106	40
No. 56	6 ft. 6 in.	.148	56
No. 60	6 ft. 0 in.	.159	60

Standard Lengths, 8, 10, 12 and 16 feet.

This is an expanded metal of large mesh made especially for roads.

NATIONAL ROAD FABRIC (WELDED)

(Manufactured by National Steel Fabric Co., Pittsburgh, Pa.)

Style	Spacing		Section Area Square Inches Per Lineal Foot		Weight Per 100 Square Feet
	Longitudinal	Transverse	Longitudinal	Transverse	
CC-77	6 inches	6 inches	.049	.049	35.7
CC-66	6 "	6 "	.058	.058	42.0
CC-55	6 "	6 "	.067	.067	48.8
CC-44	6 "	6 "	.080	.080	57.8
CC-33	6 "	6 "	.093	.093	67.6
CC-22	6 "	6 "	.108	.108	78.4

TRUSCON ROAD MESH

(Manufactured by Truscon Steel Company, Youngstown, Ohio)

207-11	6	12	.067	.011	29.2
225-11	6	12	.080	.011	33.8
225-9	6	12	.080	.017	35.9
250-11	6	12	.100	.011	40.4
192-6	6	6	.058	.058	42.0
207-6	6	6	.067	.029	45.5
295-7	6	12	.140	.025	59.0

CLINTON ELECTRICALLY WELDED FABRIC

(Manufactured by Wickwire-Spencer Steel Corporation, Worcester, Mass.)

SIZE OF MESH In Inches	WIRE GAUGE		Weight in Pounds Per 100 Square Feet
	Longitudinals	Laterals	
4 x 12	No. 9	No. 11	22.77
4 x 12	No. 8	No. 10	27.42
4 x 16	No. 6	No. 10	35.23
4 x 12	No. 3	No. 7	56.00

This fabric is made in many sizes, only a few of the stock sizes are given above.

General Note: The above tables are compiled from data furnished by the respective manufacturers. Reinforcing is furnished in rolls and sheets of various lengths and widths.

TABLE No. 16

Weights and Areas of Reinforcing Mesh suitable for Slabs

TRIANGLE MESH FABRIC

(Manufactured by American Steel & Wire Co., New York)

Style Number	Number and Gauge of Longitudinal Wires	Sectional Area, Longitudinals, Square Inches per Foot Width	Total Effective Longitudinal Sectional Area, Square Inches per Foot Width	Approximate Weight, Lbs. per 100 Square Feet
153	1 ¼ inch	.147	.153	68
168	1 No. 2 gauge	.162	.168	74
180	2 No. 6 "	.174	.180	78
208	2 No. 5 "	.202	.208	89
245	2 No. 4 "	.239	.245	103
267	3 No. 6 "	.261	.267	111
287	3 No. 5½ "	.281	.287	119
309	3 No. 5 "	.303	.309	128
336	3 No. 4½ "	.330	.336	138
365	3 No. 4 "	.359	.365	149
395	3 No. 3½ "	.389	.395	160

NATIONAL STEEL FABRIC (WELDED)

(Manufactured by National Steel Fabric Co., Pittsburgh, Pa.)

Style	Spacing of Wires		Gauge of Wires		Section Area per Lin. Ft. in Sq. In.		Weight in Lbs. per 100 Sq. Ft.
	Long.	Trans.	Long.	Trans.	Long.	Trans.	
AH510	2 in.	16 in.	5	10	.202	.011	74.6
AH49	2 in.	16 in.	4	9	.239	.013	88.5
AH38	2 in.	16 in.	3	8	.280	.015	103.6
TH711	3 in.	16 in.	7	11	.098	.009	38.1
TH610	3 in.	16 in.	6	10	.116	.011	45.1
TH510	3 in.	16 in.	5	10	.135	.011	51.8
TH49	3 in.	16 in.	4	9	.160	.013	61.4
TH38	3 in.	16 in.	3	8	.187	.015	72.0

CLINTON ELECTRICALLY WELDED FABRIC

(Manufactured by Wickwire-Spencer Steel Corporation, Worcester, Mass.)

Size of Mesh	Gauge of Wires		Sectional Area, Square Inches	Weight in Lbs. per 100 Sq. Ft.
	Longitudinals	Laterals		
2 in. x 16 in.	No. 2	No. 8	.325	119.39
2 in. x 16 in.	No. 3	No. 8	.280	103.64
2 in. x 16 in.	No. 4	No. 9	.239	88.50
2 in. x 16 in.	No. 5	No. 9	.202	75.42
2 in. x 16 in.	No. 6	No. 10	.174	64.73
2 in. x 16 in.	No. 7	No. 10	.148	55.58
2½ in. x 16 in.	No. 3	No. 8	.224	84.63
3 in. x 16 in.	No. 3	No. 8	.187	71.96
3 in. x 16 in.	No. 4	No. 9	.159	61.42
3 in. x 16 in.	No. 5	No. 9	.135	52.56
3 in. x 16 in.	No. 6	No. 10	.116	45.06

Note: Only a few of the sizes and styles sold are listed above. For complete lists communicate with the manufacturers direct.

Expanded Metal Lath and Fabric for Stucco—See Table 23

*TABLE No. 17

Building Code Requirements for Live Load

In Pounds Per Square Foot

STRUCTURE	Baltimore	Boston	Buffalo	Chicago	Cincinnati	Indianapolis	Milwaukee	Minneapolis	New Orleans	New York	Philadelphia	Pittsburgh	St. Louis	San Francisco	Seattle	Washington
Apartments	60	50	70	40	40	50	30	50	40	...	70	...	50	60	40	50
Assembly Halls	...	...	100	100	100	125	...	125	...	100	120	150	100	...	...	...
Dwellings	60	50	40	40	40	50	30	50	40	40	70	70	50	60	40	50
Hospitals	...	...	70	50	...	50	30	50	...	...	70	...	50	60	50	...
Hotels	60	...	70	50	40	75	30	50	40	...	70	...	50	60	40	50
Manufacturing	175	...	...	...	150	200	...	...	...	...	150	200	150	250	...	...
Light Manufacturing	125	125	120	100	100	100	100	100	125	...	120	...	100	125	125	...
Heavy Storehouses	250	250	...	...	150	200	...	...	...	...	150	...	...	250	...	150
Warehouses	...	250	150	...	150	200	...	...	200	...	150	200	150	250	...	150
Offices	75	100	70	50	50	75	40	75	70	60	100	...	60	60	50	75
Schools—Class Rooms	75	60	...	..	60	100	40	100	60	75	...	...	75	75	50	75
Stairways, General	...	70	...	100	80	...	60	...	70	...	...	...	...	...	100	...
Roofs—Slope Under 20°	...	40	40	25	25	30	30	50	30	40	30	50	30	30	40	25
Wind Pressure	30	...	30	20	20	...	30	30	...	30	30	...	30	20	...	30

*From "Useful Data," a handbook published by the Corrugated Bar Company, Buffalo, N. Y.

TABLE No. 18

*Table of Proportions and Quantities for One Cubic Yard of Concrete using various sizes of aggregates

Based upon laboratory investigations, using approved Materials, compressive strength, 28 days, with workable plasticity, 6 by 12-inch cylinders, 3,000 pounds per square inch.

Sizes		Fine Aggregates, Screen Openings per Inch														
		0-28			0-14			0-8			0-4			0-⅜-in.		
Coarse Aggregates Inches	Cement in bbls. Aggregates in Cubic Yards	Cement	Fine	Coarse	Cement	Fine	Coarse	Cement	Fine	Coarse	Cement	Fine	Coarse	Cement	Fine	Coarse
No. 4 Screen to ¾	Proportions.....	**1**	**1.3**	**2.4**	**1**	**1.6**	**2.4**	**1**	**1.8**	**2.3**	**1**	**2.0**	**2.3**	**1**	**2.7**	**1.5**
	Quantities.....	1.96	.37	.69	1.85	.44	.66	1.82	.48	.62	1.75	.52	.59	1.79	.72	.40
No. 4 Screen to 1	Proportions.....	**1**	**1.3**	**2.7**	**1**	**1.6**	**2.6**	**1**	**1.8**	**2.6**	**1**	**2.0**	**2.5**	**1**	**2.6**	**1.8**
	Quantities.....	1.90	.36	.76	1.77	.42	.68	1.72	.46	.66	1.67	.50	.62	1.72	.66	.46
No. 4 Screen to 1½	Proportions.....	**1**	**1.2**	**3.1**	**1**	**1.6**	**3.2**	**1**	**1.7**	**3.1**	**1**	**2**	**3**	**1**	**2.4**	**2.4**
	Quantities.....	1.82	.32	.84	1.68	.40	.79	1.63	.41	.75	1.61	.47	.72	1.62	.57	.57
⅜ to ¾	Proportions.....	**1**	**1.3**	**2.3**	**1**	**1.7**	**2.3**	**1**	**1.9**	**2.3**	**1**	**2.2**	**2.2**	**1**	**2.8**	**1.4**
	Quantities.....	1.96	.37	.67	1.85	.46	.63	1.82	.51	.62	1.75	.57	.57	1.79	.75	.37
⅜ to 1	Proportions.....	**1**	**1.3**	**2.6**	**1**	**1.7**	**2.6**	**1**	**1.9**	**2.5**	**1**	**2.2**	**2.4**	**1**	**2.7**	**1.7**
	Quantities.....	1.90	.36	.74	1.77	.44	.68	1.72	.48	.64	1.67	.54	.59	1.72	.68	.43
⅜ to 1½	Proportions.....	**1**	**1.3**	**3.0**	**1**	**1.7**	**3.0**	**1**	**1.9**	**3.0**	**1**	**2.1**	**2.9**	**1**	**2.6**	**2.2**
	Quantities.....	1.82	.35	.80	1.68	.43	.75	1.63	.46	.73	1.61	.50	.68	1.62	.63	.53
½ to ¾	Proportions.....	**1**	**1.5**	**2.3**	**1**	**1.9**	**2.2**	**1**	**2.1**	**2.2**	**1**	**2.3**	**2.1**	**1**	**2.8**	**1.3**
	Quantities.....	1.96	.44	.67	1.85	.52	.61	1.82	.56	.59	1.75	.59	.54	1.79	.75	.34
½ to 1	Proportions.....	**1**	**1.5**	**2.5**	**1**	**1.9**	**2.5**	**1**	**2.1**	**2.4**	**1**	**2.3**	**2.4**	**1**	**2.8**	**1.6**
	Quantities.....	1.90	.42	.70	1.77	.50	.66	1.72	.53	.61	1.67	.57	.59	1.72	.72	.41
½ to 1½	Proportions.....	**1**	**1.4**	**2.8**	**1**	**1.9**	**2.9**	**1**	**2.1**	**2.9**	**1**	**2.2**	**2.8**	**1**	**2.7**	**2.1**
	Quantities.....	1.82	.37	.75	1.68	.47	.73	1.63	.51	.69	1.61	.52	.66	1.62	.65	.51
½ to 2	Proportions.....	**1**	**1.4**	**3.3**	**1**	**1.9**	**3.3**	**1**	**2.0**	**3.4**	**1**	**2.2**	**3.3**	**1**	**2.7**	**2.7**
	Quantities.....	1.75	.36	.86	1.63	.46	.79	1.55	.46	.78	1.52	.50	.74	1.53	.62	.62
¾ to 1	Proportions.....	**1**	**1.7**	**2.4**	**1**	**2.1**	**2.4**	**1**	**2.4**	**2.1**	**1**	**2.6**	**2.2**	**1**	**3.1**	**1.5**
	Quantities.....	1.90	.48	.68	1.77	.55	.63	1.72	.61	.53	1.67	.64	.55	1.72	.79	.39
¾ to 1½	Proportions.....	**1**	**1.7**	**2.7**	**1**	**2.0**	**2.8**	**1**	**2.3**	**2.7**	**1**	**2.5**	**2.7**	**1**	**3.0**	**2.0**
	Quantities.....	1.82	.46	.73	1.79	.50	.70	1.63	.55	.65	1.61	.59	.64	1.62	.73	.48
¾ to 2	Proportions.....	**1**	**1.7**	**3.1**	**1**	**2.0**	**3.1**	**1**	**2.3**	**3.1**	**1**	**2.5**	**3.0**	**1**	**3.0**	**2.4**
	Quantities.....	1.75	.44	.80	1.63	.48	.75	1.55	.53	.72	1.52	.56	.67	1.53	.68	.55
1 to 1½	Proportions.....	**1**	**1.7**	**2.8**	**1**	**2.0**	**2.9**	**1**	**2.3**	**2.7**	**1**	**2.6**	**2.6**	**1**	**3.1**	**2.0**
	Quantities.....	1.82	.46	.75	1.68	.50	.73	1.63	.55	.65	1.61	.62	.62	1.62	.75	.48
1 to 2	Proportions.....	**1**	**1.5**	**3.2**	**1**	**1.9**	**3.5**	**1**	**2.2**	**3.3**	**1**	**2.4**	**3.3**	**1**	**3.0**	**2.6**
	Quantities.....	1.75	.39	.83	1.63	.46	.85	1.58	.51	.76	1.52	.54	.74	1.53	.68	.59

**Compiled by Prof. Duff A. Abrams of Structural Materials Research Laboratory, Lewis Institute, Chicago.*

HOW TO USE TABLE No. 18.

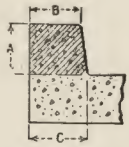
This table is based on a high-grade concrete which will give a strength of 3,000 pounds per square inch at 28 days. In other words, a concrete which with average well-graded aggregates, would require a proportion of 1:2:3. For this proportion the sand would be well-graded in size from fine up to ¼-inch, and the stone from ¼-inch up to 1½-inches. The use of this table principally is for determining the relative amounts of cement, sand and stone when this size of aggregate is not available. In other words, the contractor might find that there was available in the locality of the work only a rather fine sand and somewhat large, coarse aggregate; in which case, instead of the proportion being 1:2:3 it would need to be varied in order to secure the desired strength and quality. The bold-faced figures in the upper part of each square represent the proportion, while the lighter figures in the lower part of the square represent the amount in barrels and cubic yards of cement, sand and stone for the proportion given.

TABLE No. 19

Table of Quantities for Curbs and Gutters for Each 100 Feet of Length

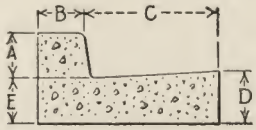
SEPARATE CURB

A	B	C	1:2:3 Mix*			1:2:4 Mix			†1:2½:5 Mix		
Ins.	Ins.	Ins.	Cement bbls.	Sand cu. yds.	Stone cu. yds.	Cement bbls.	Sand cu. yds.	Stone cu. yds.	Cement bbls.	Sand cu. yds.	Stone cu. yds.
24	6	8	7.50	2.25	3.34	6.50	1.95	3.86	5.37	2.00	3.98
30	6	8½	9.73	2.91	4.31	8.45	2.52	4.99	6.94	2.58	5.15
36	6	9	12.10	3.61	5.35	10.50	3.12	6.18	8.61	3.19	6.39



INTEGRAL CURB

A	B	C	1:1½:3 Mix			1:2:3 Mix			1:2:4 Mix		
Ins.	Ins.	Ins.	Cement bbls.	Sand cu. yds.	Stone cu. yds.	Cement bbls.	Sand cu. yds.	Stone cu. yds.	Cement bbls.	Sand cu. yds.	Stone cu. yds.
6	6	7	1.91	0.42	0.85	1.74	0.52	0.77	1.51	0.45	0.89



COMBINED CURB AND GUTTER

A	B	C	D	E	1:2:3 Mix*			1:2:4 Mix			†1:2½:5 Mix		
Ins.	Ins.	Ins.	Ins.	Ins.	Cement bbls.	Sand cu. yds.	Stone cu. yds.	Cement bbls.	Sand cu. yds.	Stone cu. yds.	Cement bbls.	Sand cu. yds.	Stone cu. yds.
6	6	18	7	6	8.70	2.60	3.85	7.55	2.25	4.45	6.20	2.30	4.60
6	6	24	7½	6	10.80	3.22	4.77	9.35	2.79	5.52	7.68	2.85	5.70

*A 1:2:3 mix is much used for curb work, especially where no plastering of the surface is allowed.

†The leaner 1:2½:5 mix is generally employed for curbs which will be finished by a mortar plaster coat. This practice is now not favored by many persons, but where it is allowed an additional allowance should be in the estimate for the cement used in the plastered coat.

TABLE No. 20

For Determining Materials Required for Small Quantities of Concrete*

Cubic feet of Concrete	1:1½:3 Mixture			1:2:3 Mixture			1:2:4 Mixture			1:2½:5 Mixture			1:3:6 Mixture		
	Bags Cement	Cu. Ft. Sand	Cu. Ft. Stone	Bags Cement	Cu. Ft. Sand	Cu. Ft. Stone	Bags Cement	Cu. Ft. Sand	Cu. Ft. Stone	Bags Cement	Cu. Ft. Sand	Cu. Ft. Stone	Bags Cement	Cu. Ft. Sand	Cu. Ft. Stone
100	28	42	84	25 4/5	51 3/5	77 2/5	22	44	88	18	45	90	16	48	96
90	25 1/5	37 4/5	75 3/5	23 1/5	46 2/5	69 3/5	19 4/5	39 3/5	79 1/5	16 1/5	40 1/2	81	14 2/5	43 1/5	86 2/5
80	22 2/5	33 3/5	67 1/5	20 2/3	41 1/3	62	17 3/5	35 1/5	70 2/5	14 2/5	36	72	12 4/5	38 2/5	76 4/5
70	19 3/5	29 2/5	58 4/5	18	36	54	15 2/5	30 4/5	61 3/5	12 3/5	31 1/2	63	11 1/5	33 3/5	67 1/5
60	16 4/5	25 1/5	50 2/5	15 1/2	31	46 1/2	13 1/5	26 2/5	52 4/5	10 4/5	27	54	9 3/5	28 4/5	57 3/5
50	14	21	42	13	26	39	11	22	44	9	22 1/2	45	8	24	48
40	11 1/5	16 4/5	33 3/5	10 1/3	20 2/3	31	8 4/5	17 3/5	35 1/5	7 1/5	18	36	6 2/5	19 1/5	38 2/5
30	8 2/5	12 3/5	25 1/5	7 3/4	15 1/2	23 1/4	6 3/5	13 1/5	26 2/5	5 2/5	13 1/2	27	4 4/5	14 2/5	28 4/5
20	5 3/5	8 2/5	16 4/5	5 1/5	10 2/5	15 3/5	4 2/5	8 4/5	17 3/5	3 3/5	9	18	3 1/5	9 3/5	19 1/5
10	2 4/5	4 1/5	8 2/5	2 3/5	5 1/5	7 4/5	2 1/5	4 2/5	8 4/5	1 4/5	4 1/2	9	1 3/5	4 4/5	9 3/5
9	2 1/2	3 4/5	7 3/5	2 1/3	4 2/3	7	2	4	8	1 3/5	4	8	1 1/2	4 1/3	8 2/3
8	2 1/4	3 3/8	6 3/4	2	4 1/6	6 1/4	1 3/4	3 1/2	7	1 2/5	3 3/5	7 1/5	1 1/4	3 7/8	7 3/4
7	2	3	6	1 4/5	3 1/2	5 2/5	1 1/2	3	6	1 1/4	3 1/8	6 1/4	1 1/8	3 3/8	6 3/4
6	1 2/3	2 1/2	5	1 3/5	3 1/5	4 3/5	1 1/3	2 2/3	5 1/3	1 1/10	2 3/4	5 1/2	1	3	6
5	1 2/5	2 1/10	4 1/5	1 1/3	2 2/3	4	1 1/10	2 1/5	4 2/5	9/10	2 1/4	4 1/2	4/5	2 2/5	4 4/5
4	1 1/8	1 3/4	3 3/8	1	2	3 1/5	7/8	1 3/4	3 1/2	7/10	1 4/5	3 3/5	5/8	2	4
3	4/5	1 1/4	2 1/2	3/4	1 1/2	2 1/3	2/3	1 1/3	2 2/3	1/2	1 1/8	2 2/3	1/2	1 1/2	3
2	9/16	7/8	1 11/16	1/2	1	1 1/2	7/16	7/8	1 3/4	1/3	9/10	1 4/5	5/16	1	2
1	9/32	7/16	7/8	1/4	1/2	3/4	7/32	7/16	7/8	1/5	1/2	1	5/32	1/2	1

*This table acts as a supplement to Table No. 3. It will be found convenient for figuring quantities for small amounts of concrete where calculating in cubic yards or fraction of a cubic yard would be inconvenient. Note that all quantities of cement are in bags and concrete in cubic feet. (One barrel of cement equals four bags.)

Example:—To find the materials for 291 cubic feet of 1:2:4 mixture, look in the columns headed "1:2:4 mixture," copy out the figures for 100 cubic feet and multiply them by two, to make 200. This gives 44 *bags cement*, 88 *cubic feet of sand, and* 176 *of stone*. Then look under the same head, opposite 90 cubic feet; 19 4/5 *bags cement*, 39 3/5 *cubic feet sand, and* 79 1/5 *cubic feet stone*. Then look opposite 1 cubic foot and there is found 7/16 *bag cement*, 7/32 *cubic foot sand, and* 7/8 *cubic foot stone*. Add these three, and it will be found that for 291 cubic feet of concrete in 1:2:4 mixture, there will be needed 64 bags cement, 128 cubic feet sand, and 256 cubic feet stone or gravel.

TABLE No. 21

Materials for Small Foundation Walls of Concrete*

Wall 7 ft. high—Material needed for each 10 ft. length.

Thickness	1:2:4 Mixture			1:2½:5 Mixture			1:3:6 Mixture		
	Bags Cement	Cubic Feet Sand	Cubic Feet Stone	Bags Cement	Cubic Feet Sand	Cubic Feet Stone	Bags Cement	Cubic Feet Sand	Cubic Feet Stone
8 in.	10⅓	20⅗	41⅕	8⅕	21	42	7½	22⅖	44⅘
9 in.	11⅗	23⅘	46⅖	9⅖	23⅗	47⅖	8⅖	25⅕	50⅖
10 in.	12⅘	25⅗	51⅖	10½	26⅖	52½	9⅖	28	56
12 in.	15⅖	30⅘	61⅗	12⅗	31½	63	11⅕	33⅗	67⅕
18 in.	23	46⅕	92⅖	18⅘	47⅕	94⅖	16⅘	50⅖	100

Wall 8 ft. high—Material needed for each 10 ft. length.

8 in.	11⅘	23½	47	9⅗	24	48	8½	25½	51⅕
9 in.	13⅕	26⅖	52⅘	10⅘	27	54	9⅗	28⅘	57⅗
10 in.	14⅗	29⅖	58½	12	30	60	10⅗	32	64
12 in.	17⅗	35⅕	70⅖	14⅖	36	72	12⅘	38⅖	76⅘
18 in.	26⅖	52⅘	106	21⅗	54	108	19⅕	57½	115

Wall 9 ft. high—Material needed for each 10 ft. length.

8 in.	13⅕	26½	53	10⅘	27	54	9⅖	28⅘	57½
9 in.	14⅘	29⅗	59⅕	12⅕	30⅖	60⅘	10⅘	32⅖	64⅘
10 in.	16½	33	66	13½	33⅘	67½	12	36	72
12 in.	19⅘	39⅗	79⅕	16⅕	40½	81	14⅖	43⅕	86⅖
18 in.	29¾	59½	119	24⅖	60⅘	121	21⅗	64⅘	130

Material for each 10 ft. of length of Footings 1:3:6 Mixture

Size (height x width)	Cement Bags	Sand Cu. Ft.	Stone Cu. Ft.
6 in. x 12 in	⅘	2⅖	4⅘
7 in. x 14 in	1⅛	3⅜	6¾
8 in. x 16 in	1½	4⅓	8⅔
9 in. x 18 in	1⅘	5⅓	10⅗
10 in. x 20 in	2⅕	6½	13
12 in. x 24 in	3⅙	9⅓	18⅗
15 in. x 30 in	5	14⅗	29⅖

*This table is for estimating the materials necessary for small foundation walls such as those for houses and small buildings. When estimating these, be sure to make deductions for any wall or door-openings. The 1:2:4 mixture is given for foundation walls where soil is wet and a water-tight concrete is necessary. Because the quantities involved in the table are small, the cement is given in bags and the sand and stone in cubic feet. To change the cement quantities to barrels divide by 4 and to change the sand and stone quantities to cubic yards divide by 27. For foundation walls provided with footings, add the quantities taken from the footing table.

TABLE No. 22

Strength of Lumber Used in Concrete Forms

Safe Loads for Posts and Braces supporting Wood Forms*

Height of Post	4 x 4-in. Post	6 x 6-in. Post	8 x 8-in. Post
Feet	Lbs.	Lbs.	Lbs.
8	9,600	26,400	
9	8,800	25,200	
10	8,000	24,000	48,000
11		22,800	46,400
12		21,600	44,800
14		19,200	41,600

Total Safe Loads for Wooden Beams†

(Loads Uniformly Distributed)

Span, in feet	SIZE OF WOOD BEAM							
	2 x 4 ins.	2 x 6 ins.	2 x 8 ins.	2 x 10 ins.	2 x 12 ins.	3 x 10 ins.	3 x 12 ins.	4 x 12 ins.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
5	700							
6	590							
7	500	1150						
8	440	1000	1750					
9	395	880	1555					
10	350	800	1400	2220	3200	3300		
12	295	660	1145	1850	2660	2750	4000	5340
14		570	1000	1590	2280	2380	3430	4570
16				1390	2000	2080	3000	4000

*This table is for the purpose of determining the number and spacing of posts for supporting floor forms and similar uses. For example, the weight of the fresh concrete and of the forms for a floor section are figured and then by means of this table the required number of posts can be found. Care must be exercised in locating the posts so that the load is properly distributed.

†The total safe loads given in this table are figured as distributed uniformly along the entire length of the beam. If the load is concentrated as in the case of a post resting on the beam only one-half of the load given in the table should be used.

TABLE No. 23

Styles and Weights of Metal Lath for Stucco

EXPANDED METAL LATH

Name of Manufacturer	Style or Number	Gauge and Weight per Sq. Yd.	Details
The Berger Mfg. Co. Canton, Ohio	B B Diamond Mesh	2.2, 2.5, 3.0, 3.4 lbs.	Painted, Galvanized Copper bearing and Toncan Metal, not self-furring
	3/8-inch Ribplex	3.0, 3.5, 4.0 lbs.	Painted, Copper bearing and Toncan metal
Youngstown Pressed Steel Co. Warren, Ohio	Y P S Stuccomesh	1.8 lbs.	Painted Steel, not self-furring
	Mahoning Self-furring	3.4 lbs.	Painted, Galvanized or copper bearing
	Mahoning Flat	3.4 lbs.	Same, not self-furring
Consolidated Exp. Metal Cos. Braddock, Pa.	24 F Rid-Gib	24 gauge 3.4 lbs.	Galvanized or painted, self-furring
Northwestern Expanded Metal Co., Chicago, Ill.	Kno-Burn Corrugated	24 gauge 3.4 lbs.	Copper bearing or galvanized, self-furring
The Bostwick Steel Lath Co. Niles, Ohio	"Truss-Loop"	4.5 & 5.5 lbs.	Individual design—galvanized
	Bostwick Expanded "Niles," "Lock," 3/8 in. Rib Exp.	2.2 to 4.0 lbs.	Various styles and meshes "Lock" self-furring
The General Fireproofing Co. Youngstown, Ohio	Herringbone	24 gauge 3.4 lbs.	Galvanized or painted, self-furring
Truscon Steel Co., Youngstown, Ohio	3/8-inch Hy-Rib	3.0, 3.5, 4.0 lbs.	Copper bearing and plain steel painted, self-furring
	Truscon Diamond	2.2, 2.5, 3.0, 3.4 lbs.	Galvanized, copper bearing, and plain steel painted. Flat or self-furring

WIRE LATH

The New Jersey Wire Cloth Co., Trenton, N. J.	No. 20-6V-G Jersey Wire Lath	2½-inch mesh No. 20 wire	Galvanized or painted. Woven with 3/8-inch metal ribs. Self-furring
	No. 20-O-G Jersey Wire Lath	Same	Same without ribs. Not self-furring
Wickwire-Spencer Steel Corp., Buffalo, N. Y., and Worcester, Mass.	"Clinton" Wire Lath	2½-inch mesh. No. 19 wire 3.2 lbs.	Galvanized or painted. Not self-furring
	"Clinton" Wire Lath	2½-inch mesh No. 20 wire 3.8 lbs.	Gavanized or painted. V. stiffened self-furring
	"Clinton" Welded sheathing	No. 13 and 19 gauge wires	Special type; combination of galvanized welded wire fabric and water-proof felt; not self-furring
National Steel Fabric Co., Pittsburgh, Pa.	P-214	2-inch mesh No. 14 wire	Paper backed
	C-214	Same	Self-furring
	AA-1414	Same	Plain
American Steel & Wire Co., 30 Church Street, New York	2-L triangle mesh stucco reinforcement	No. 12 and 14 wires 2.84 lbs.	Galvanized, self-furring

Explanatory Note: This table is not intended to give complete information on the various styles of metal lath. For complete details and full information it is advisable to communicate directly with the manufacturer. Expanded metal lath is generally sold in sheets packed in bundles. Wire lath usually is sold in rolls.

TABLE No. 24

Safe Loads for Concrete Slabs

NOTE: The tables given below are intended to apply to small single slabs such as are found in self-supporting porch floors, small garage floors, floors in residences, etc. **No attempt should be made to use the tables for designing floor systems in larger structures or reinforced concrete buildings** because conditions of support and loading are so varied that it would not be safe or economical to use these tables without making a complete analysis of conditions in conformance with regular design practice. The slabs given in the tables are considered as supported along two sides or four sides by adequate beams or walls, and the figures do not, of course, apply to what is known as flat slab girderless floor systems. Reinforcing bars are figured as having their centers 1 inch up from the bottom of the slab and as being arranged in accordance with standard reinforcing practice.

Safe Loads, uniformly distributed, in Pounds per Square Foot, Slab supported along two sides

Thickness of Slab	SPAN—IN FEET							Reinforcing Bars* Transverse Between Supports
	4	5	6	7	8	10	12	
4 "	433	259	164	107	71	27		½" round—spaced 8½"
4½"		360	233	156	106	48		½" round—spaced 7¼"
5 "		468	319	218	152	75	33	½" round—spaced 6¼"
5½"			414	286	203	105	52	⅝" round—spaced 8¾"
6 "			520	362	260	139	74	⅝" round—spaced 7¾"

*The amount of longitudinal or temperature reinforcing—parallel to supports—depends on area of slab. For small and medium size slabs ⅜ in. round bars spaced 12 in. apart will be sufficient.

Square Slabs (supported along four sides) Safe load, uniformly distributed, in Pounds per Square Foot

Thickness of Slab	SIZE OF SLAB—IN FEET							2-Way Reinforcing Bars†
	6x6	7x7	8x8	9x9	10x10	12x12	14x14	
3 "	150	100	67	45	28			⅜" round—spaced 7 " each way
3½"	253	174	123	88	63	30		⅜" round—spaced 5¾" each way
4 "	378	264	192	140	104	58	28	½" round—spaced 8½" each way
4½"		368	268	200	152	98	50	½" round—spaced 7¼" each way
5 "		498	366	278	212	128	78	½" round—spaced 6¼" each way

†Square slabs are reinforced in two directions, bars lying at right angles to each other; in other words, in a 3 in. thick square slab the reinforcing will consist of 2 systems of bars at right angles to each other and *each* system consisting of ⅜ in. round rods spaced 7-in. on centers.

TABLE No. 25

Table for Spacing Reinforcing Bars

Note—Did you ever want to use in concrete slabs reinforcing bars of a size other than you had originally figured?

Sometimes the stock of bars runs out and a new supply must be ordered, and it is impossible to quickly secure the correct size. Or a few bars may be left over from another part of the work which should be used up. The table given below is for the purpose of quickly and conveniently finding the equivalent spacings of various sizes of reinforcing bars when used for reinforcing slabs. Of course, experience and good judgment must be used in employing such a table because obviously it would not be proper to substitute 1-inch bars for ⅜-inch because the spacing would be out of all proportion. The table legitimately should be used when, for example ⅝-inch bars are substituted for ½-inch, etc. It should be borne in mind also that there are limits to the spacing of slab reinforcing bars, since the bars should not be spaced too wide, especially for thin slabs; also bars should not be spaced so closely together that coarse aggregate will not easily pass between the bars.

Table No. 30 gives another method for substituting one size bar for another size.

HOW TO USE THE TABLE

Suppose the plans called for ⅝″ round bars spaced 4 inches on centers, and you wanted to utilize some ¾″ round bars you had on hand. Read down the left-hand column to ⅝″ round and then across the table where under the column headed ¾″ round you will find the figure 1.44. Multiply the spacing given, 4″, by 1.44, and the result is 5.76 inches, or 5¾ inches, the spacing to be used for ¾″ round bars.

Size of Bar Specified	SIZE OF BAR AVAILABLE																	
	¼″ Rd.	¼″ Sq.	⅜″ Rd.	⅜″ Sq.	½″ Rd.	½″ Sq.	⅝″ Rd.	⅝″ Sq.	¾″ Rd.	¾″ Sq.	⅞″ Rd.	⅞″ Sq.	1″ Rd.	1″ Sq.	1⅛″ Rd.	1⅛″ Sq.	1¼″ Rd.	1¼″ Sq.
⅜″ Rd.	0.45	0.57	....	1.27	1.78	2.26	2.79	....	....	....	....	....	....	....	....	....	....	....
⅜″ Sq.	....	.44	0.79	....	1.40	1.78	2.18	2.78	....	....	....	....	....	....	....	....	....	....
½″ Rd.	....	....	.56	.72	....	1.27	1.56	1.99	2.25	2.86	....	....	....	....	....	....	....	....
½″ Sq.	....	....	.44	.56	.79	....	1.23	1.56	1.77	2.25	2.41	....	....	....	....	....	....	....
⅝″ Rd.	....	....	....	.46	.64	.82	....	1.27	1.44	1.83	1.96	2.50	2.56	....	....	....	....	....
⅝″ Sq.	....	....	....	....	.50	.64	.79	....	1.13	1.44	1.54	1.96	2.02	2.56	2.55	....	....	....
¾″ Rd.	....	....	....	....	.45	.57	.70	.89	....	1.27	1.37	1.74	1.78	2.27	2.25	2.86	2.78	....
¾″ Sq.	....	....	....	....	....	.45	.55	.70	.79	....	1.07	1.36	1.40	1.78	1.77	2.25	2.18	2.78
⅞″ Rd.	....	....	....	....	....	.42	.51	.65	.73	.94	....	1.27	1.31	1.66	1.65	2.11	2.04	2.60
⅞″ Sq.	....	....	....	....	....	....	.40	.51	.58	.73	.79	....	1.03	1.31	1.30	1.65	1.60	2.04
1 ″ Rd.	....	....	....	....	....	....	....	.50	.56	.72	.77	.98	....	1.27	1.27	1.61	1.56	1.99
1 ″ Sq.	....	....	....	....	....	....	....	....	.44	.56	.60	.77	.79	....	.99	1.27	1.23	1.56
1⅛″ Rd.	....	....	....	....	....	....	....	....	.44	.57	.61	.77	.79	1.01	....	1.27	1.24	1.57
1⅛″ Sq.	....	....	....	....	....	....	....	....	....	.44	.48	.61	.62	.79	.79	....	.97	1.24
1¼″ Rd.	....	....	....	....	....	....	....	....	....	.46	.49	.62	.64	.82	.81	1.03	....	1.27
1¼″ Sq.	....	....	....	....	....	....	....	....	....	....	....	.49	.50	.64	.64	.81	.79	....

TABLE No. 26

Coloring Mortar and Concrete

Mineral Color Pigments

Color Desired	Coloring Material	Pounds of Color Required per bag of Atlas-White	
		Light Shade	Medium Shade
Grays, blue-black and black...	Germantown lampblack....	½	1
	Carbon black.....	½	1
	Black oxide of manganese..	1	2
Blue shade.....	Ultramarine blue.....	5	10
Brownish-red to dull brick red..	Red oxide of iron.....	5	10
Bright red to vermilion.....	Mineral turkey red.....	5	10
Red sandstone to purplish red..	Indian red.....	5	10
Brown to reddish-brown.....	Metallic brown (oxide).....	5	10
Buff, colonial tint and yellow...	Yellow ochre.....	5	10
	Yellow oxide.....	5	10
Green shade.....	Chromium oxide.....	5	10
	Greenish blue ultramarine..	6	

Natural Color Sand and Pigments

Red or Pink.....	Red Marbles or Pink Granites and Feldspars.....
Yellow and Buff.....	Yellow Marble or Yellow Sand.....
Green.....	Green Marble or Granite.....
Black.....	Black Marble, Slate or Slag.....
White.....	White Marble or White Silica Sand used with Atlas-White Portland Cement.....

Note—The amounts of color pigments given above are intended merely to give an idea of the approximate quantities required. The shade resulting from the use of color pigments depends to a great extent upon the color of the sand and cement used. The only sure way of getting the shade required is to mix up small samples of mortar or concrete, using varying amounts of color in the samples. *Allow the small samples to harden and dry out before judging the color.*

Decided color tones usually cannot be obtained by the use of natural sand or stone-chips—only the more delicate shades are available.

It is advisable and often absolutely essential to use white Portland cement when colored mortar or concrete is to be secured.

TABLE No. 27

Horizontal Reinforcing for Circular Water Tanks

Distance Down from Top of Tank	Inside Diameter of Tank							
	5 ft. Dia.		10 ft. Dia.		15 ft. Dia.		20 ft. Dia.	
	Diameter of Bars	Spacing	Diameter of Bars	Spacing	Diameter of Bars	Spacing	Diameter of Bars	Spacing
Top to 5 ft.	¼″	7½″	⅜″	8½″	½″	10 ″	½″	7½″
5 ft. to 10 ft....	⅜″	8½″	½″	7½″	½″	5 ″	⅝″	6 ″
10 ft. to 15 ft....	⅜″	5 ″	½″	5 ″	⅝″	5¼″	¾″	5¾″
15 ft. to 20 ft....	.....	.....	⅝″	6 ″	¾″	5½″	⅞″	5¾″

Vertical Reinforcing: ½ in. round bars spaced 18 in. on centers for all sizes of tanks given.

Horizontal Reinforcing: To be bent in the form of hoops or rings of a diameter to allow bar to lie in center of wall. At joints in hoops bars to be lapped 12 inches for ¼ in. bars; 18 inches for ⅜ in. bars; 25 inches for ½ in. bars; 30 inches for ⅝ in. bars; 35 inches for ¾ in. bars; 40 inches for ⅞ in. bars. Table is figured for round bars—if square bars are used the spacings given may be increased 20%.

Example: To find the horizontal reinforcing for a tank 10 ft. in diameter by 12 ft. deep, use the column headed "10 ft. diameter." The horizontal reinforcing rings will then consist of ⅜ in. bars spaced 8½ in. on centers for the walls from the top down to a point 5 ft. below. For the next 5 ft. of wall the reinforcing consists of ½ in. bars spaced 7½ in. For the bottom 2 ft. of the wall—that is, the space from 10 ft. below the top to 12 ft. below the top—the reinforcing would be ½ in. bars spaced 5 in.

These tanks are figured for water storage, but since oil is lighter than water, it will be safe to use the same reinforcing for oil storage tanks.

TABLE No. 28

Quantities of Atlas White Portland Cement Required for Lining Swimming Pools

(For estimating purposes only)

Width (In Feet)

Length in Ft.	20	25	30	35	40	45	50	55	60	65	70	75
	bbls.	bbls.	bbls.	bbls.	bbls.	bbls.	bbls.	bbls.	bbls.	bbls.	bbls.	bbls.
40	6.5	8.0	9.0	10.0	11.0	.....	.....	.....	.....	.....	.....	.....
50	8.0	9.5	10.5	12.0	13.5	14.5	16.0	.....	.....	.....	.....	.....
60	9.5	11.0	12.5	14.0	15.5	17.0	18.5	20.0	21.5	.....	.....	.....
70	....	12.5	14.0	16.0	17.5	19.5	21.0	23.0	24.5	26.5	28.0	.....
80	....	.....	16.0	18.0	20.0	22.0	24.0	25.5	27.5	29.5	31.5	33.5
90	....	.....	.....	20.0	22.0	24.0	26.5	28.5	30.5	33.0	35.0	37.0
100	....	.....	.....	.....	24.5	26.5	29.0	31.5	34.0	36.0	38.5	41.0
110	....	.....	.....	.....	.....	29.0	31.5	34.0	37.0	39.5	42.0	44.5
120	....	.....	.....	.....	.....	.....	34.5	37.0	40.0	42.5	45.5	48.0
130	....	.....	.....	.....	.....	.....	.....	40.0	43.0	46.0	49.0	52.0

The quantities given in the table are the number of barrels (4 bags per bbl.) of Atlas White Portland Cement required for the lining of a standard swimming pool of the size indicated. In computing these quantities the pool was assumed to be three feet deep at one end and nine feet deep at the opposite end. The amounts are to the nearest half barrel and are only approximate for the purpose of estimating. The lining was assumed to be applied ½ inch thick, made of a mortar consisting of 1 part Atlas White to 2½ parts of selected sand.

TABLE No. 29

SIZE OF STEEL I-BEAMS

for supporting Concrete Floors

For use only in Dwellings, Apartments and Small Store Buildings where the floor load does not exceed 75 lbs. per square foot.*

Span of I-Beams	Spacing of I-Beams (Transverse distance between beams)			
	5 Feet Supporting 3 in. Slab	**6 Feet** Supporting 3½ in. Slab	**7 Feet** Supporting 3½ in. Slab	**8 Feet** Supporting 4 in. Slab
	Size and Weight of I-Beam	Size and Weight of I-Beam	Size and Weight of I-Beam	Size and Weight of I-Beam
	in. lbs.	in. lbs.	in. lbs.	in. lbs.
8 ft.	4″ — 9½	5″ — 9¾	5″ — 12¼	5″ — 14¾
10 ft.	5″ — 12¼	6″ — 12¼	6″ — 14¾	7″ — 15
12 ft.	6″ — 14¾	7″ — 15	7″ — 17½	8″ — 18
14 ft.	7″ — 15	8″ — 17½	8″ — 13	9″ — 21
16 ft.	8″ — 17½	8″ — 25½	9″ — 25	9″ — 35
18 ft.	9″ — 21	9″ — 30	10″ — 30	10″ — 40
20 ft.	10″ — 22¼	10″ — 30	10″ — 40	12″ — 35

***Note**—The sizes of I-Beams given in the table are made to cover average conditions and the figures are to be used only for small work. For larger buildings and unusual conditions, the regular methods of design by an architect or engineer should be followed, since in this way added economy and safety may be insured. The weight in pounds given in the table is the weight per running foot of the I-Beam.

For data on concrete slabs, see Handy Reference Table No. 24. Thin concrete slabs supported on I-Beams often are reinforced with wire mesh. For information on such reinforcing consult the manufacturers of wire mesh.

For the highest type of permanent and fireproof construction, it is desirable to have the I-Beams below the concrete slab encased in concrete poured at the same time the slab is poured.

TABLE No. 30

Equivalent Spacing of Reinforcing Bars for Concrete Slabs

To be used in Substituting One Size Bar for Another Size

3/8" Bars		1/2" Bars		5/8" Bars		3/4" Bars		7/8" Bars		1" Bars	
Rd.	Sq.	Rd.	Sq.	Rd.	Sq.	Rd.	Sq.	Rd.	Sq.	Rd.	Sq
										3"	3 3/4"
									3 3/8"	3 1/2	4 1/2
								3 "	3 3/4	4	5
								3 1/2	4 1/2	4 1/2	5 3/4
								3 3/4	4 3/4	5	6 1/4
						3 "	3 3/4"	4 1/4	5 1/4	5 3/8	6 3/4
						3 1/4	4 1/8	4 1/2	5 5/8	6	7 1/2
					3 3/8"	3 3/4	4 3/4	5	6 1/2	6 1/2	8 1/2
					3 1/2	4	5	5 1/2	7	7	9
				3 "	3 3/4	4 1/4	5 1/2	6	7 1/2	7 1/2	9 1/2
				3 1/4	4 1/8	4 3/4	6	6 1/2	8	8 1/4	. . .
				3 1/2	4 1/2	5	6 1/2	7	8 3/4	9	
			3 "	3 3/4	4 3/4	5 1/2	6 7/8	7 3/8	9 1/4	9 1/2	
			3 1/4	4	5	5 3/4	7 3/8	8	10		
			3 1/2	4 1/4	5 1/2	6	7 3/4	8 1/4			
			3 5/8	4 1/2	5 3/4	6 1/2	8 1/4	8 3/4			
		3 "	3 3/4	4 3/4	6	6 3/4	8 1/2	9 1/4			
		3 1/4	4 1/8	5 1/4	6 1/2	7 1/2	9 1/2				
		3 1/2	4 1/2	5 1/2	7	8	10				
		3 3/4	4 3/4	6	7 1/2	8 1/2					
		4 1/4	5 1/2	6 1/2	8 1/2	9 1/2					
		4 1/2	5 3/4	7	9	10					
		4 3/4	6	7 1/2	9 1/2						
	3 3/8"	5	6 3/8	8	10						
3 "	3 3/4	5 1/4	6 3/4	8 1/4							
3 1/8	4	5 1/2	7	8 3/4							
3 3/8	4 1/4	6	7 5/8	9 3/8							
3 5/8	4 5/8	6 1/2	8 1/4	10							
4	5 1/8	7	9								
4 1/4	5 3/8	7 1/2	9 5/8								
4 1/2	5 3/4	8	10								

Explanation: Often it is desirable to use a different size bar than the one specified for reinforcing slabs, because a certain size is in stock or left over from a previous job. This table will give the equivalent spacing for the new size of bar.

For Example: If the reinforcing of a slab is specified as 5/8" square bars, spaced 7" on centers, and it is desired to use 1/2" square bars, run down the column headed "5/8" square" to the spacing 7". Then go to the left along the same line until reaching the column "1/2" square" size. The spacing will be found to be 4 1/2". This means that 1/2" square bars can be substituted for 5/8" square, provided the spacing is made 4 1/2" on centers instead of 7".

It will be noted that some rather unusual spacings are given, frequently in 1/8 of an inch. Of course such a spacing as this is rarely used in practical work, but the builder will be safe if he uses the next smaller 1/4 or 1/2" spacing; that is, if 4 1/8" is specified he will be safe in using 4", etc.

Of course this table must be used with common sense and good judgment. It would be absurd to try to substitute a 7/8 or 1" bar when a 3/8" bar is specified and vice versa.

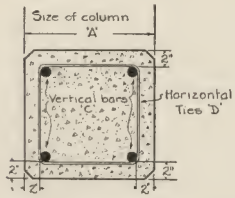


TABLE No. 31

SAFE VERTICAL LOADS FOR CONCRETE COLUMNS AND PIERS

Square Reinforced Concrete Columns

(1:2:4 Mixture of Stone or Gravel High Quality Concrete)

A Column Size	B Maximum Height of Column *	C Size of 4 Vertical Bars	D Spacing of ¼" Horizontal Ties	E Safe Load Acting Vertically †
8 in.	8 ft.	⅜ in. round	6 in.	7,700 lbs.
		⅜ in. square	6 in.	8,300 lbs.
		½ in. rd.	8 in.	8,700 lbs.
10 in.	10 ft.	½ in. rd.	8 in.	16,400 lbs.
		½ in. sq.	8 in.	17,500 lbs.
		⅝ in. rd.	10 in.	18,600 lbs.
12 in.	12 ft.	½ in. rd.	8 in.	33,600 lbs.
		½ in. sq.	8 in.	35,000 lbs.
		⅝ in. rd.	10 in.	36,500 lbs.
		⅝ in. sq.	10 in.	38,600 lbs.
		¾ in. rd.	12 in.	40,000 lbs.
		¾ in. sq.	12 in.	43,000 lbs.
		⅞ in. rd.	12 in.	44,000 lbs.
13 in.	13 ft.	½ in. sq.	8 in.	42,800 lbs.
		⅝ in. rd.	10 in.	44,100 lbs.
		⅝ in. sq.	10 in.	46,200 lbs.
		¾ in. rd.	12 in.	47,500 lbs.
		¾ in. sq.	12 in.	50,600 lbs.
		⅞ in. rd.	12 in.	51,500 lbs.
		⅞ in. sq.	12 in.	55,600 lbs.
14 in.	14 ft.	⅝ in. rd.	10 in.	52,700 lbs.
		⅝ in. sq.	10 in.	54,700 lbs.
		¾ in. rd.	12 in.	56,200 lbs.
		¾ in. sq.	12 in.	59,100 lbs.
		⅞ in. rd.	12 in.	60,000 lbs.
		⅞ in. sq.	12 in.	64,200 lbs.
		1 in. rd.	12 in.	64,700 lbs.
		1 in. sq.	12 in.	70,000 lbs.

* In Division B, for conservative design the maximum height of column is given as 12 times the diameter, although the Joint Committee on Concrete and Reinforced Concrete allows a maximum height of 15 times the diameter.

† Safe loads given in Division E are loads acting vertically only. For "eccentric" loads or loads acting not directly through the axis of the column, a special calculation must be made.

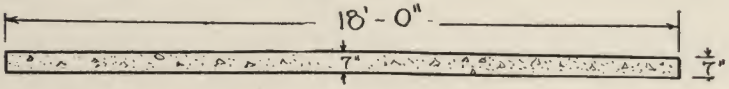
Concrete Piers (Not Reinforced)

Size of Pier	Maximum Height of Pier	Safe Load for 1:2:4 Mix ‡	Safe Load for 1:2½:5 Mix ‡
6 x 6 in.	2 ft.—0 in.	16,000 lbs.	13,000 lbs.
8 x 8 in.	2 ft.—8 in.	29,000 lbs.	23,000 lbs.
10 x 10 in.	3 ft.—4 in.	45,000 lbs.	36,000 lbs.
12 x 12 in.	4 ft.—0 in.	65,000 lbs.	52,000 lbs.
14 x 14 in.	4 ft.—8 in.	88,000 lbs.	70,000 lbs.
15 x 15 in.	5 ft.—0 in.	101,000 lbs.	81,000 lbs.

‡ The safe loads given for piers refer to the supporting strength of the pier itself. Naturally the pier must rest on a footing of adequate area so that the foundation material will have sufficient bearing power to prevent settlement under load.

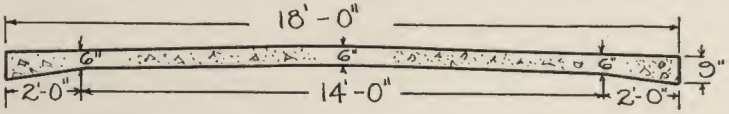
TABLE No. 32

QUANTITIES FOR FOUR STANDARD CONCRETE HIGHWAY SECTIONS



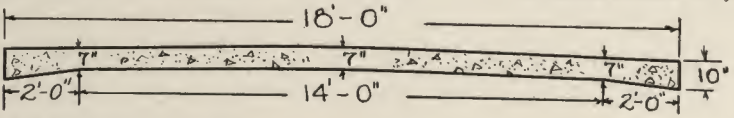
Area cross section = 10.5 sq. ft.

Cu. yd. of concrete per lin. ft. = .389 cu. yd.		Cu. yd. per mile = 2053.92	cu. yd.
Cement for 1 lin. ft. of concrete 1:1½:3 = .743 bbl.		For one mile = 3907.2	bbl.
Sand for 1 lin. ft. of concrete 1:1½:3 = .163 cu. yd.		For one mile = 862.6	cu. yd.
Stone for 1 lin. ft. of concrete 1:1½:3 = .331 cu. yd.		For one mile = 1747.7	cu. yd.
Cement for 1 lin. ft. of concrete 1:2 :3 = .677 bbl.		For one mile = 3574 6	bbl.
Sand for 1 lin. ft. of concrete 1:2 :3 = .202 cu. yd.		For one mile = 1066.6	cu. yd.
Stone for 1 lin. ft. of concrete 1:2 :3 = .299 cu. yd.		For one mile = 1578.7	cu. yd.



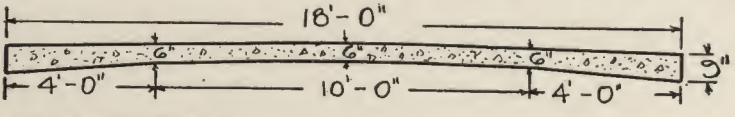
Area of cross section = 9.5 sq. ft.

Cu. yd. of concrete per lin ft. = .352 cu. yd.		Cu. yd. per mile = 1858.6	cu. yd.
Cement for 1 lin. ft. of concrete 1:1½:3 = .672 bbl..		For one mile = 3548.2	bbl.
Sand for 1 lin. ft. of concrete 1:1½:3 = .148 cu. yd.		For one mile = 781.4	cu. yd.
Stone for 1 lin. ft. of concrete 1:1½:3 = .299 cu. yd.		For one mile = 1578.7	cu. yd.
Cement for 1 lin. ft. of concrete 1:2 :3 = .612 bbl.		For one mile = 3231.4	bbl.
Sand for 1 lin. ft. of concrete 1:2 :3 = .183 cu. yd.		For one mile = 966.2	cu. yd.
Stone for 1 lin. ft. of concrete 1:2 :3 = .271 cu. yd.		For one mile = 1430.9	cu. yd.



Area of cross section = 11 sq. ft.

Cu. yd. concrete per lin. ft. = .407 cu. yd.		Cu. yd. per mile = 2149.0	cu. yd.
Cement for 1 lin. ft. of concrete 1:1½:3 = .777 bbl.		For one mile = 4101.6	bbl.
Sand for 1 lin. ft. of concrete 1:1½:3 = .171 cu. yd.		For one mile = 902.9	cu. yd.
Stone for 1 lin. ft. of concrete 1:1½:3 = .346 cu. yd.		For one mile = 1826.9	cu. yd.
Cement for 1 lin. ft. of concrete 1:2 :3 = .708 bbl.		For one mile = 3738.2	bbl.
Sand for 1 lin. ft. of concrete 1:2 :3 = .212 cu. yd.		For one mile = 1119.4	cu. yd.
Stone for 1 lin. ft. of concrete 1:2 :3 = .313 cu. yd.		For one mile = 1652.6	cu. yd.



Area of cross section = 10 sq. ft.

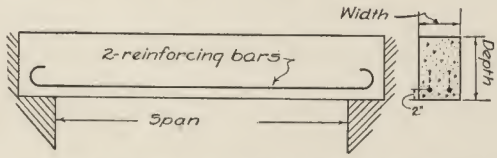
Cu. yd. of concrete per lin. ft. = .370 cu. yd.		Cu. yd. per mile = 1953.6	cu. yd.
Cement for 1 lin. ft. of concrete 1:1½:3 = .707 bbl.		For one mile = 3733.0	bbl.
Sand for 1 lin. ft. of concrete 1:1½:3 = .155 cu. yd.		For one mile = 818.4	cu. yd.
Stone for 1 lin. ft. of concrete 1:1½:3 = .315 cu. yd.		For one mile = 1663.2	cu. yd.
Cement for 1 lin. ft. of concrete 1:2 :3 = .644 bbl.		For one mile = 3400.3	bbl.
Sand for 1 lin. ft. of concrete 1:2 :3 = .192 cu. yd.		For one mile = 1013.8	cu. yd.
Stone for 1 lin. ft. of concrete 1:2 :3 = .285 cu. yd.		For one mile = 1504.8	cu. yd.

Cement for 1 cu. yd. of concrete { 1:1½:3 Mix. = 1.91 bbl. / 1:2 :3 Mix. = 1.74 bbl.		Sand for 1 cu. yd. of concrete { 1:1½:3 Mix. = 0.42 / 1:2 :3 Mix. = 0.52	cu. yd. / cu. yd.
Stone for 1 cu. yd. of concrete { 1:1½:3 Mix. = 0.85 / 1:2 :3 Mix. = 0.77	cu. yd. / cu. yd.		

Based on 1 bbl. cement equal 4 cu. ft.; voids in stone, 45 per cent.
Factors used from Taylor and Thompson: "Concrete, Plain and Reinforced."

TABLE No. 33

Reinforced Concrete Lintels*



SUPPORTING 8-INCH MASONRY WALLS

Size of Lintel, Width x Depth	Span (Width of Opening)					
	2′—4″	3′—0″	3′—10″	4′—6″	5′—2″	6′—0″
	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars
6″ x 8″....	2—3/8″	2—1/2″	.....	.....	.....	.....
8″ x 8″....	2—3/8″	2—1/2″	2—3/4″	.....	.....	.....
8″ x 10″....	2—3/8″	2—3/8″	2—1/2″	2—5/8″	.....	.....
8″ x 12″....	.....	2—3/8″	2—1/2″	2—1/2″	2—5/8″	2—7/8″
8″ x 14″....	.....	.....	2—3/8″	2—1/2″	2—5/8″	2—5/8″

SUPPORTING 12-INCH MASONRY WALLS

Size of Lintel, Width x Depth	Span (Width of Opening)					
	2′—4″	3′—0″	3′—10″	4′—6″	5′—2″	6′—0″
	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars	No. & Size of Bars
8″ x 8″....	2—1/2″	2—3/4″	.....	.....	.....	.....
8″ x 10″....	2—3/8″	2—1/2″	2—3/4″	.....	.....	.....
8″ x 12″....	.....	2—1/2″	2—5/8″	2—5/8″	.....	.....
8″ x 14″....	.....	2—3/8″	2—1/2″	2—5/8″	2—3/4″	2—1″

*Loads supported by lintels are difficult to definitely determine. The load depends upon the location of openings above the lintel; upon the loads coming on the wall above the lintel, if it is a load-bearing wall; and upon the arching action of the wall material itself. For this reason conservative assumptions have been used in preparing the table, and it should be adequate for any average condition.

All bars specified are round bars and they are to be hooked at the ends as shown in the sketch. When the opening is of another size than those given in the table, use the figures given for the next *largest* opening.

TABLE No. 34

AMOUNT* OF MIXING WATER FOR CONCRETE

Proportions			Mixing Water Required per Bag of Cement		Mixing Water Required per Cubic Yard of Mixed Concrete	
Cement	Sand	Stone	Minimum (gallons)	Maximum (gallons)	Minimum (gallons)	Maximum (gallons)
1	1½	3	5½	6	42	46
1	2	3	5¾	6¼	40	43½
1	2	4	6	6½	36	39
1	2½	5	7¼	7¾	36	38½
1	3	6	8¼	8¾	35	37

AMOUNT* OF MIXING WATER FOR CONCRETE FLOORS, ROADS AND PAVEMENTS

1:2:3 Mixture—One Course

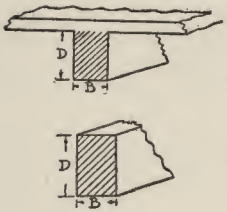
Average Thickness	For 100 Square Feet		For 1,000 Square Yards	
	Minimum (Gals)	Maximum (Gals.)	Minimum (Gals.)	Maximum (Gals.)
4 inches	49	53	.....	.....
5 inches	62	67	.....	.....
6 inches	74	80	6,700	7,250
7 inches	..	..	7,750	8,430
8 inches	..	..	8,870	9,650
9 inches	..	..	10,000	10,880

*Obviously, it is impossible to more than approximate the amounts of water required, since a number of changeable conditions may greatly affect the quantity used. Grading of aggregate, amount of water in sand and stone, consistency of mix, etc., are all influencing factors.

Note: It is advisable to estimate generously on the amount of water required for concrete work. There will be some wastage, and in addition, water will be required for boiler, if mixer is steam-driven; for washing out forms and for sprinkling and curing, especially for floors, sidewalks and pavements.

TABLE No. 35

QUANTITIES FOR CONCRETE BEAMS AND GIRDERS



DIRECTIONS FOR USING

In Table A select the proper number for breadth of beam (B) and depth of beam (D). Then in Table B find the amount of material corresponding to this number. The amounts given are for 1 foot length of beam. Multiply this amount by total length of beam or beams. The result will be the total amount of cement, sand and stone required.

Example: In a building there are to be 20 beams each 25 feet long and 11 inches wide by 22 inches deep. The mix is 1:2:4. The number 1.68 in Table A corresponds to a 11x22 inch beam. In Table B the number 1.68 calls for .0939 bbls. cement, .0280 cu. yds. sand and .0554 cu. yds. stone. Since there will be a total length of all beams of 20x25 feet equal 500 feet the materials required will be:

500 x .0939 = 46.9 bbls. cement
500 x .0280 = 14.0 cu. yds. sand
500 x .0554 = 27.7 cu. yds. stone

Table A

B—BREADTH OF BEAM— IN INCHES

D = DEPTH OF BEAM —IN INCHES	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6	.17	.21	.25	.29	.33	.38	.42								
8	.22	.28	.33	.39	.45	.50	.56	.61							
10	.28	.35	.42	.49	.56	.63	.70	.77	.83	.90	.97				
12	.33	.42	.50	.58	.67	.75	.83	.92	1.00	1.08	1.17	1.25	1 33		
14		.49	.58	.68	.78	.88	.97	1.07	1.17	1.26	1.36	1.46	1.56	1.65	
16			.67	.78	.89	1.00	1.11	1.22	1.33	1.45	1.56	1.67	1.78	1.89	2.00
18			.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25
20					1.11	1.25	1.39	1.53	1.67	1.81	1.95	2.08	2.22	2.36	2.50
22						1.38	1.53	1.68	1.83	1.99	2.12	2.29	2.44	2.60	2.75
24							1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.84	3.00
26							1.81	1.99	2.17	2.35	2.53	2.71	2.89	3.07	3.25
28							1.95	2.12	2.33	2.53	2.72	2.92	3.11	3.31	3.50
30								2.29	2.50	2.71	2.92	3.13	3.33	3.54	3.75
36								2.75	3.00	3.25	3.50	3.75	4.00	4 25	4.50

Continued on Opposite Page. →

TABLE No. 35—*Continued (from preceding page)*

Table B—Quantities for 1 Foot Length of Beam

No.	1:1½:3 MIX			1:2:4 MIX			No.	1:1½:3 MIX			1:2:4 MIX		
	Cement bbls.	Sand cubic yards	Stone cubic yards	Cement bbls.	Sand cubic yards	Stone cubic yards		Cement bbls.	Sand cubic yards	Stone cubic yards	Cement bbls.	Sand cubic yards	Stone cubic yards
.17	.0118	.0026	.0053	.0093	.0028	.0055	1.63	.1149	.0252	.0512	.0908	.0271	.0536
.21	.0147	.0032	.0066	.0116	.0035	.0069	1.65	.1168	.0256	.0521	.0924	.0275	.0545
.22	.0156	.0034	.0070	.0124	.0037	.0073	1.67	.1179	.0258	.0525	.0932	.0278	.0549
.25	.0177	.0039	.0079	.0140	.0042	.0082	1.68	.1188	.0260	.0529	.0939	.0280	.0554
.28	.0196	.0043	.0088	.0155	.0046	.0092	1.75	.1237	.0271	.0551	.0978	.0292	.0577
.29	.0206	.0045	.0092	.0163	.0049	.0096	1.78	.1257	.0276	.0560	.0994	.0296	.0586
.33	.0235	.0052	.0105	.0186	.0056	.0110	1.81	.1276	.0280	.0569	.1010	.0301	.0595
.35	.0245	.0054	.0109	.0194	.0058	.0114	1.83	.1296	.0284	.0577	.1025	.0306	.0604
.38	.0265	.0058	.0118	.0210	.0063	.0124	1.88	.1326	.0291	.0591	.1048	.0313	.0618
.39	.0275	.0060	.0123	.0218	.0065	.0128	1.89	.1336	.0293	.0595	.1058	.0315	.0623
.42	.0294	.0065	.0131	.0233	.0069	.0137	1.95	.1375	.0302	.0613	.1087	.0324	.0641
.45	.0315	.0069	.0140	.0249	.0074	.0147	1.99	.1403	.0308	.0625	.1110	.0331	.0654
.49	.0344	.0075	.0153	.0272	.0081	.0160	2.00	.1414	.0310	.0630	.1118	.0333	.0659
.50	.0354	.0078	.0158	.0280	.0083	.0165	2.08	.1473	.0323	.0656	.1164	.0347	.0687
.56	.0392	.0086	.0175	.0310	.0093	.0183	2.12	.1499	.0328	.0668	.1185	.0353	.0699
.58	.0413	.0091	.0184	.0327	.0097	.0193	2.13	.1502	.0329	.0669	.1188	.0354	.0700
.61	.0432	.0095	.0193	.0342	.0102	.0201	2.17	.1531	.0336	.0682	.1210	.0361	.0714
.63	.0442	.0097	.0197	.0349	.0104	.0206	2.22	.1571	.0344	.0700	.1242	.0370	.0732
.67	.0472	.0103	.0210	.0373	.0111	.0220	2.25	.1591	.0349	.0709	.1258	.0375	.0742
.68	.0481	.0106	.0215	.0381	.0114	.0224	2.29	.1620	.0355	.0722	.1281	.0382	.0755
.70	.0491	.0108	.0219	.0389	.0116	.0229	2.33	.1649	.0362	.0735	.1304	.0389	.0769
.75	.0530	.0116	.0236	.0419	.0125	.0247	2.35	.1658	.0364	.0739	.1311	.0391	.0773
.77	.0541	.0119	.0241	.0428	.0128	.0252	2.36	.1669	.0366	.0743	.1319	.0393	.0778
.78	.0551	.0121	.0245	.0436	.0130	.0257	2.44	.1726	.0379	.0769	.1365	.0407	.0805
.83	.0589	.0129	.0262	.0466	.0139	.0275	2.50	.1768	.0388	.0788	.1398	.0417	.0824
.88	.0620	.0136	.0276	.0490	.0146	.0289	2.53	.1785	.0391	.0795	.1412	.0421	.0832
.89	.0629	.0138	.0280	.0498	.0148	.0293	2.60	.1838	.0403	.0819	.1453	.0433	.0857
.90	.0639	.0140	.0285	.0505	.0151	.0298	2.67	.1884	.0413	.0840	.1490	.0444	.0878
.92	.0649	.0142	.0289	.0513	.0153	.0303	2.71	.1915	.0420	.0853	.1514	.0451	.0893
.97	.0687	.0151	.0307	.0544	.0162	.0321	2.72	.1924	.0422	.0857	.1521	.0454	.0897
1.00	.0707	.0155	.0315	.0559	.0167	.0330	2.75	.1944	.0426	.0866	.1537	.0458	.0906
1.07	.0756	.0166	.0337	.0598	.0178	.0353	2.84	.2004	.0439	.0893	.1585	.0473	.0934
1.11	.0785	.0172	.0350	.0621	.0185	.0366	2.89	.2044	.0448	.0911	.1616	.0482	.0953
1.13	.0795	.0174	.0354	.0629	.0188	.0371	2.92	.2063	.0452	.0919	.1631	.0486	.0962
1.17	.0825	.0181	.0368	.0652	.0195	.0385	3.00	.2121	.0465	.0945	.1677	.0500	.0989
1.22	.0863	.0189	.0385	.0683	.0204	.0402	3.07	.2171	.0476	.0967	.1717	.0512	.1012
1.25	.0884	.0194	.0394	.0699	.0208	.0412	3.11	.2199	.0482	.0980	.1739	.0518	.1025
1.26	.0893	.0196	.0398	.0706	.0211	.0416	3.13	.2209	.0484	.0984	.1747	.0521	.1030
1.33	.0942	.0207	.0420	.0745	.0222	.0439	3.25	.2298	.0504	.1024	.1817	.0542	.1071
1.36	.0962	.0211	.0429	.0761	.0227	.0449	3.31	.2340	.0513	.1043	.1850	.0552	.1091
1.38	.0972	.0213	.0433	.0769	.0229	.0453	3.33	.2356	.0517	.1050	.1863	.0556	.1099
1.39	.0982	.0215	.0438	.0777	.0232	.0458	3.50	.2475	.0543	.1103	.1957	.0584	.1154
1.45	.1022	.0224	.0455	.0808	.0241	.0476	3.54	.2505	.0549	.1116	.1981	.0591	.1168
1.46	.1032	.0226	.0460	.0816	.0243	.0481	3.75	.2651	.0581	.1181	.2096	.0625	.1236
1.50	.1061	.0233	.0473	.0839	.0250	.0494	4.00	.2828	.0620	.1260	.2236	.0667	.1318
1.53	.1080	.0237	.0481	.0854	.0255	.0504	4.25	.3005	.0659	.1339	.2376	.0709	.1401
1.56	.1099	.0241	.0490	.0869	.0259	.0513	4.50	.3182	.0698	.1418	.2516	.0750	.1483

Suggestion for Estimating—In taking off quantities for a beam and slab floor system, the most convenient method is to first figure quantities for floor slab alone. (See Handy Reference Table No. 9). Then add together lengths of each group of beams and girders of same size (breadth and depth). Figure quantities for beams and girders as given in this table and add quantity figured for floor slab alone. This will give quantities for entire floor.

TABLE No. 36

Quantities for Concrete Columns

For each 1 foot of height*

Diameter of Column "D"	ROUND COLUMNS 						SQUARE COLUMNS 						OCTAGONAL COLUMNS 					
	1-1½-3			1-2-4			1-1½-3			1-2-4			1-1½-3			1-2-4		
	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.	Cement Bbls.	Sand Cu. Yds.	Stone Cu. Yds.
6″	.013	.003	.006	.011	.003	.006	.017	.004	.008	.014	.004	.008	.015	.003	.007	.012	.004	.007
7″	.019	.004	.008	.015	.004	.009	.025	.005	.011	.020	.006	.012	.019	.004	.009	.015	.005	.009
8″	.025	.005	.011	.020	.006	.012	.031	.007	.014	.025	.007	.015	.026	.006	.012	.021	.006	.012
9″	.031	.007	.014	.024	.007	.014	.040	.009	.018	.032	.009	.019	.033	.007	.014	.026	.008	.015
10″	.038	.008	.017	.031	.009	.018	.049	.011	.022	.039	.012	.023	.040	.009	.018	.032	.009	.019
12″	.055	.012	.025	.044	.013	.026	.071	.015	.031	.056	.016	.033	.059	.013	.026	.047	.014	.028
14″	.076	.017	.034	.060	.018	.035	.095	.021	.042	.075	.022	.044	.079	.017	.035	.063	.019	.037
16″	.099	.022	.044	.079	.023	.046	.124	.028	.057	.101	.030	.060	.105	.023	.047	.083	.025	.049
18″	.125	.027	.056	.099	.029	.058	.159	.034	.070	.126	.036	.074	.133	.029	.058	.106	.031	.063
20″	.154	.034	.069	.122	.036	.072	.196	.043	.087	.155	.046	.092	.162	.036	.072	.128	.038	.075
22″	.187	.041	.083	.148	.044	.087	.231	.051	.103	.183	.055	.107	.197	.043	.088	.155	.046	.092
24″	.222	.049	.098	.175	.052	.103	.283	.062	.126	.224	.067	.132	.235	.052	.104	.186	.055	.110
26″	.260	.057	.116	.206	.061	.121	.332	.073	.148	.263	.079	.155	.275	.060	.122	.218	.065	.128
28″	.302	.066	.134	.238	.071	.140	.386	.085	.168	.300	.091	.176	.319	.070	.142	.252	.075	.148
30″	.340	.075	.151	.269	.080	.158	.444	.098	.197	.350	.104	.206	.367	.081	.163	.290	.087	.171
32″	.400	.088	.178	.318	.095	.187	.496	.117	.228	.404	.120	.240	.420	.092	.188	.330	.104	.196
34″	.446	.098	.199	.354	.105	.208	.568	.125	.252	.450	.134	.264	.470	.103	.209	.372	.110	.218
36″	.500	.108	.225	.396	.117	.234	.638	.135	.279	.504	.144	.297	.531	.117	.234	.423	.126	.252
38″	.567	.123	.248	.441	.130	.260	.706	.155	.314	.560	.166	.329	.578	.129	.262	.465	.138	.274
40″	.617	.136	.275	.488	.145	.287	.785	.173	.349	.620	.185	.366	.651	.143	.290	.515	.153	.303

***Directions**—The figures given in the table are for 1 foot of height of column. A good way for estimating the quantities in columns for a building is to add the height of all columns of the same diameter and thus derive the total height, then multiply this height in feet by the figure given in the table for the size of column and the result will be the quantity for that size of column for the entire building. *For Example*—A building will have 50 columns round in section, 18 inches in diameter and 10 feet high; the mixture 1:1½:3. In the table we find .125 barrels of cement, .027 cubic yards of sand and .056 cubic yards of stone for this size of column for each foot of height. Since we have 50 columns each 10 feet high, we will have a total heght of 500 feet. Multiply the 500 feet by the figures given in the table and the result will be the amount of cement, sand, and stone required for the columns of the size given.

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THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED
ATLAS